BooNE MC status,   Feb 5 2016

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The issues to be resolved..

- At the Jan 19 meeting, we agreed to work on demonstrating better that the most significant change, the one that explain the ~9 % reduction of the neutrino flux, ν_μ from p decay, is due to changes in the π-Be, π-Al, etc scattering models, elastic and inelastic.

- While we can change (in v4.p8 and v4p9) the total-cross section via the G4UI data cards, the scattering models, i.e., the shape of the double differential cross scattering angle and energy loss, is version dependent, as shown about two or three months ago while analyzing the π-C quasi-elastic scattering at 955 MeV/c

- Quantify the above change wit the adhoc plot is the topic of this discussion.

    – With "hacking" into Geant4 code (G4HadronicProcess class, etc...) ?

   – Instrumenting more our BNB G4 code.

The "Hack proposed ~ 2 weeks ago.

✔ Did not work... Yet... please ignore the last plot on the set of slide written for the Jan 19 2016 meeting . This plot was not discussed, I realised the potential side-effects in modifying the volatile G4 tracking stack(s), this is why it was not discussed in great length..

✔ If the plots shown later in the talks are not yet convincing enough, then we can rethink it again..

Quantifying "the probability for scattering"

- ✔ Using G4-public tracking/stepping information...

- ✔ Does not tell us everything, but safer, and can be ported across G4 version with minor modification

- ✔ So, back to the thread from last week: Geometry is one slug and the aluminum in the horn... Also, 3 Be slugs, all other volumes made of vacuum.
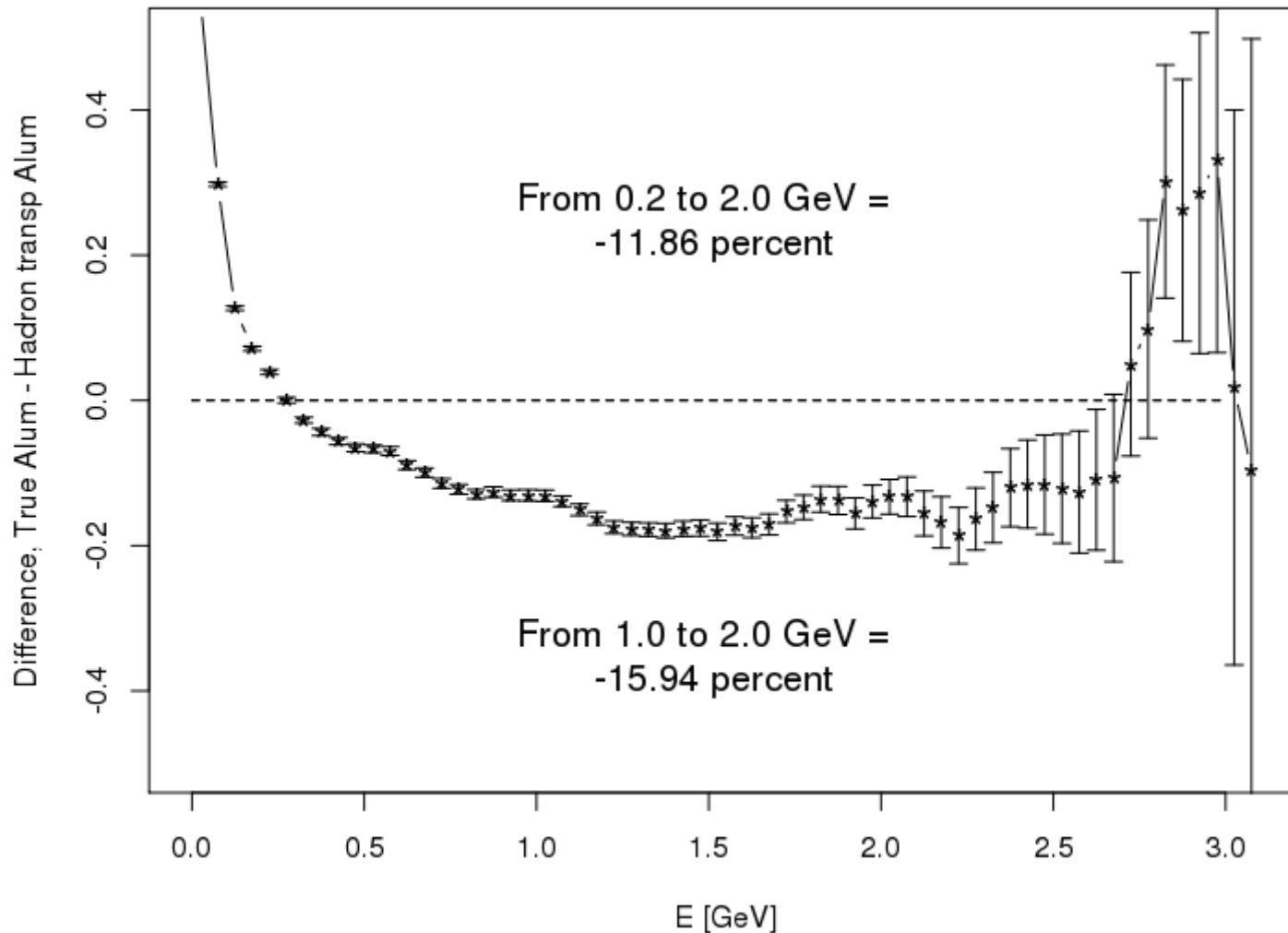
Horn is Aluminum, ν_μ flux.
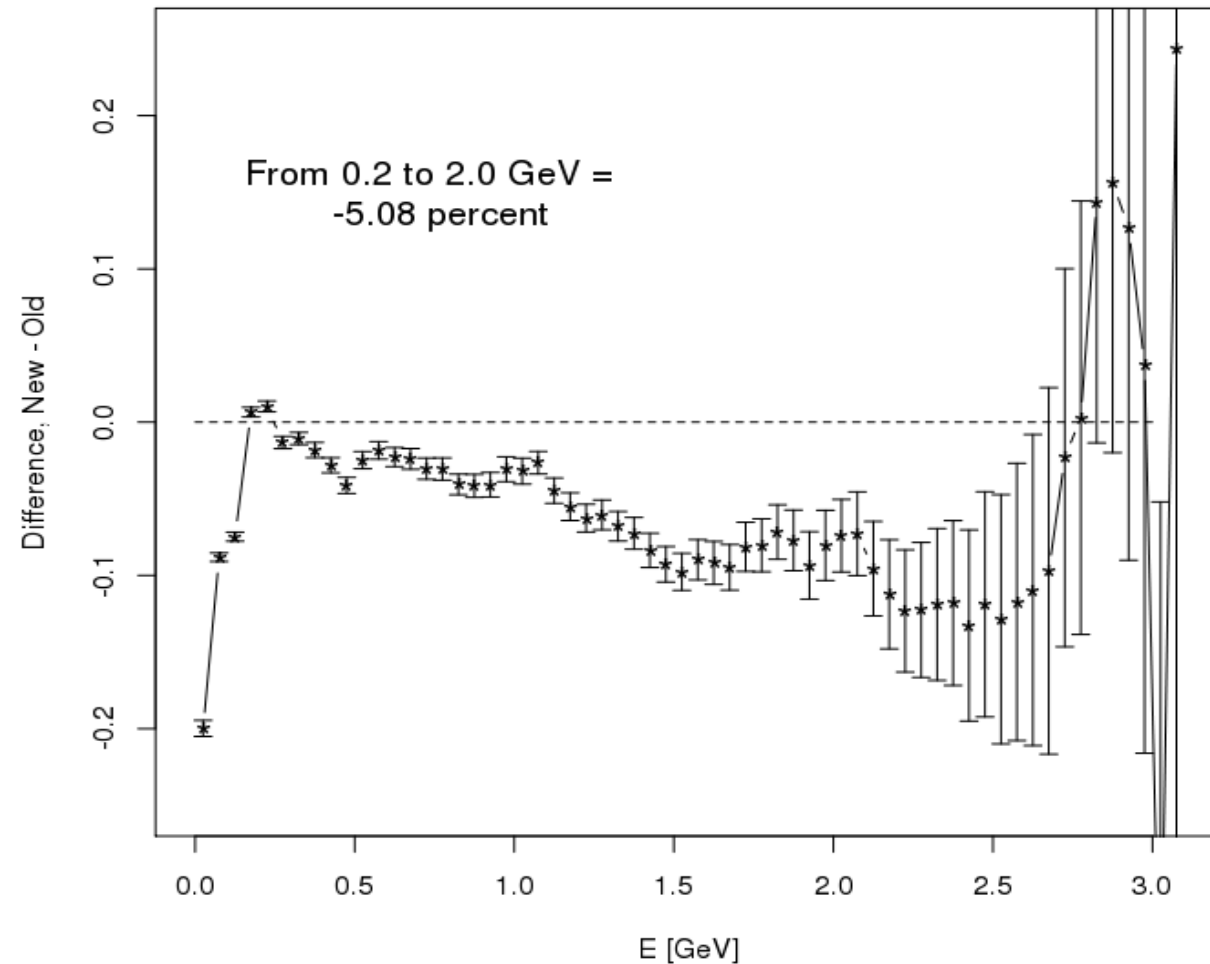
~ 4 % more than just one Be slug.

Let us document this better.

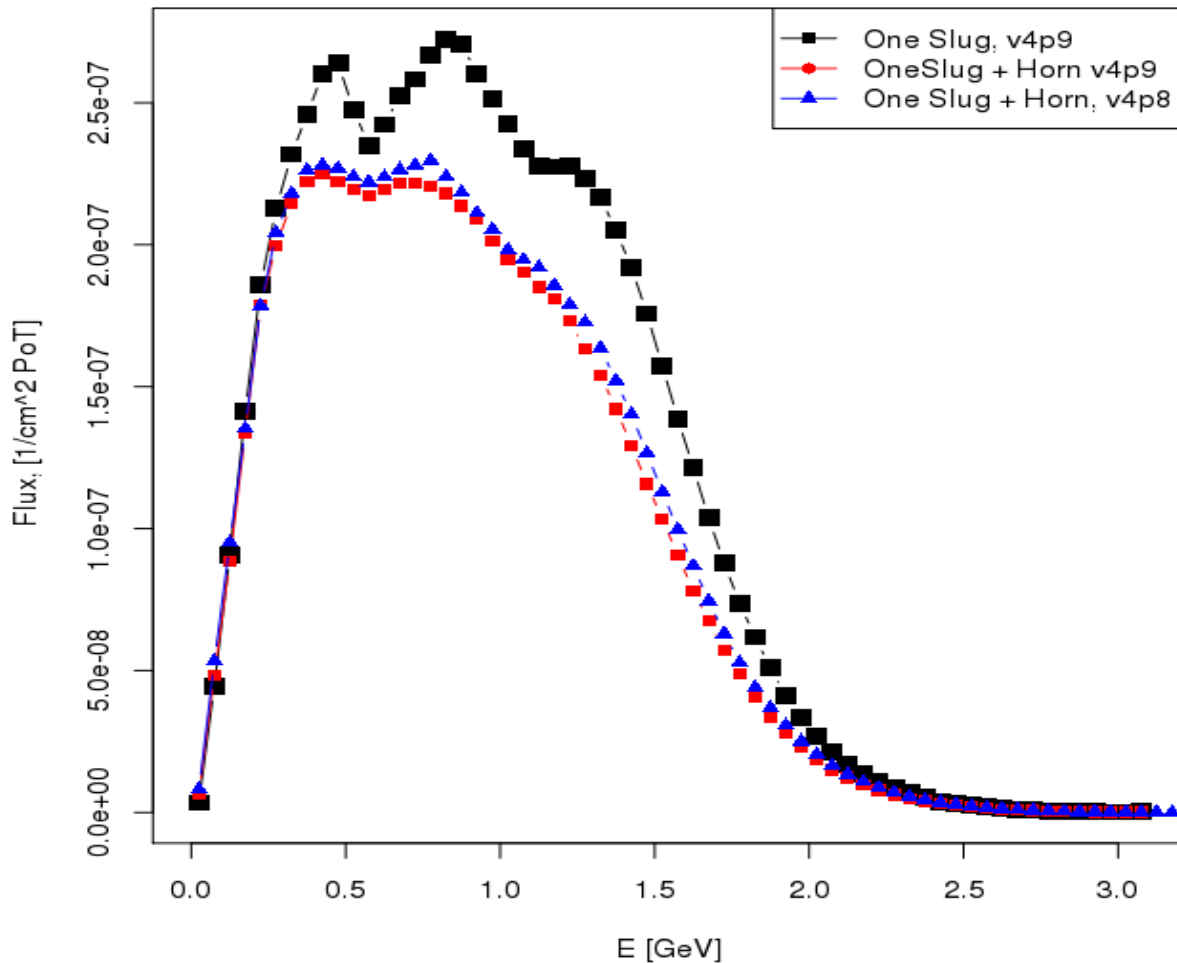# Effective Hadronic absorption in Horn, v4p9
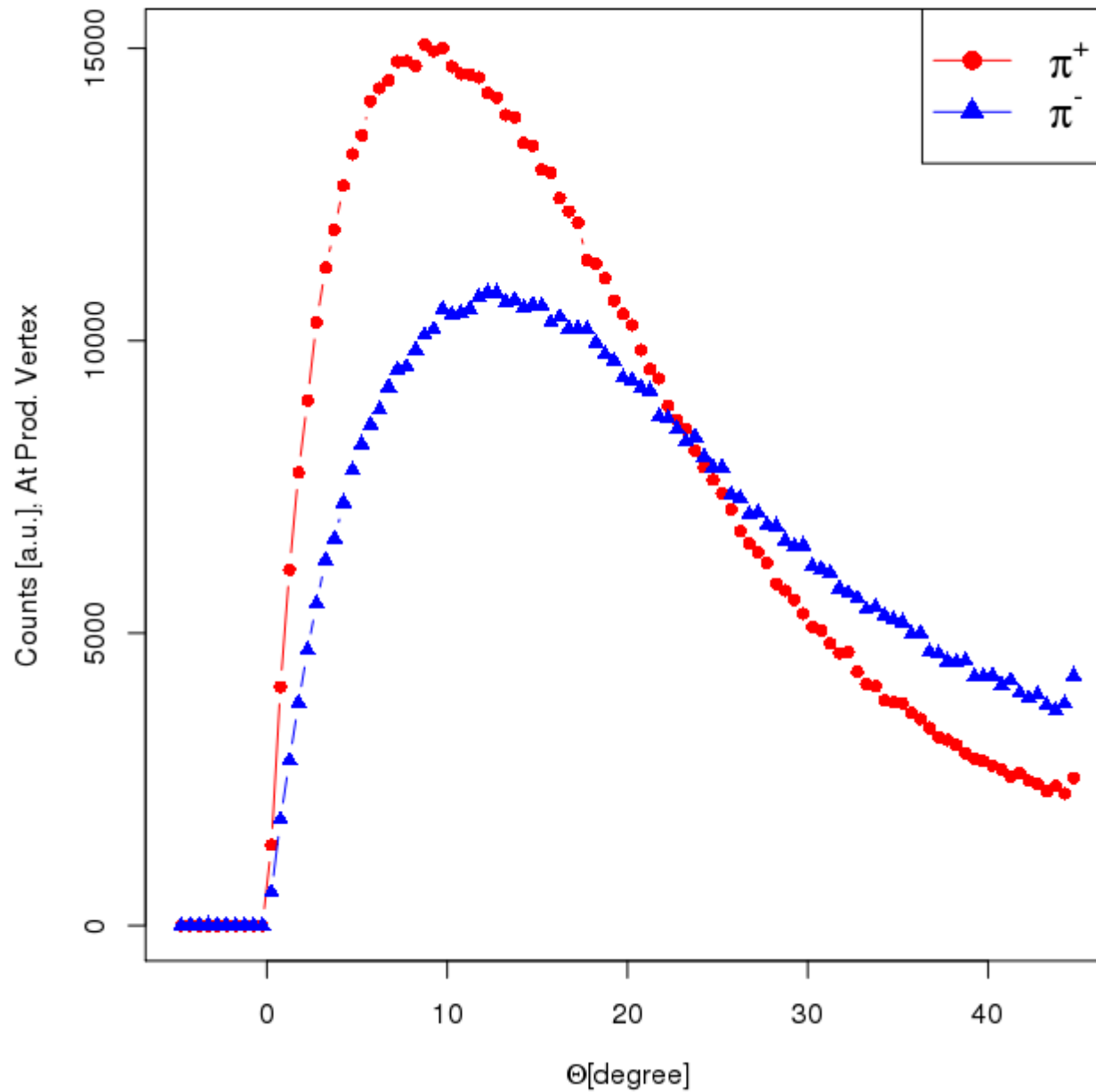
Also shown on Jan 19 2016..

From 0.2 to 2.0 GeV = -11.86 percent

From 1.0 to 2.0 GeV = -15.94 percent

Y-axis: Difference; True Alum - Hadron transp Alum

X-axis: E [GeV]

Confirming plots..

New, Jan 27 2016...

Same as before, here we just have Each ν_μ from π decays separately.
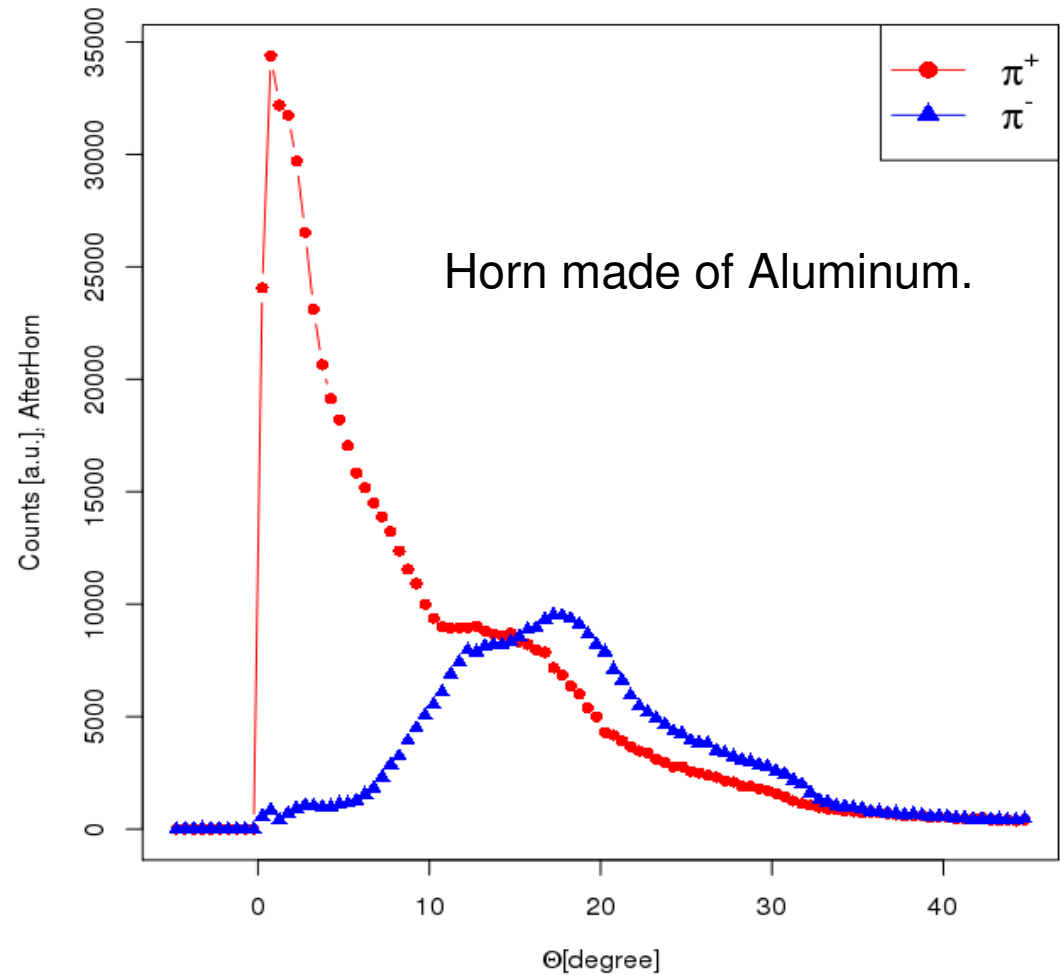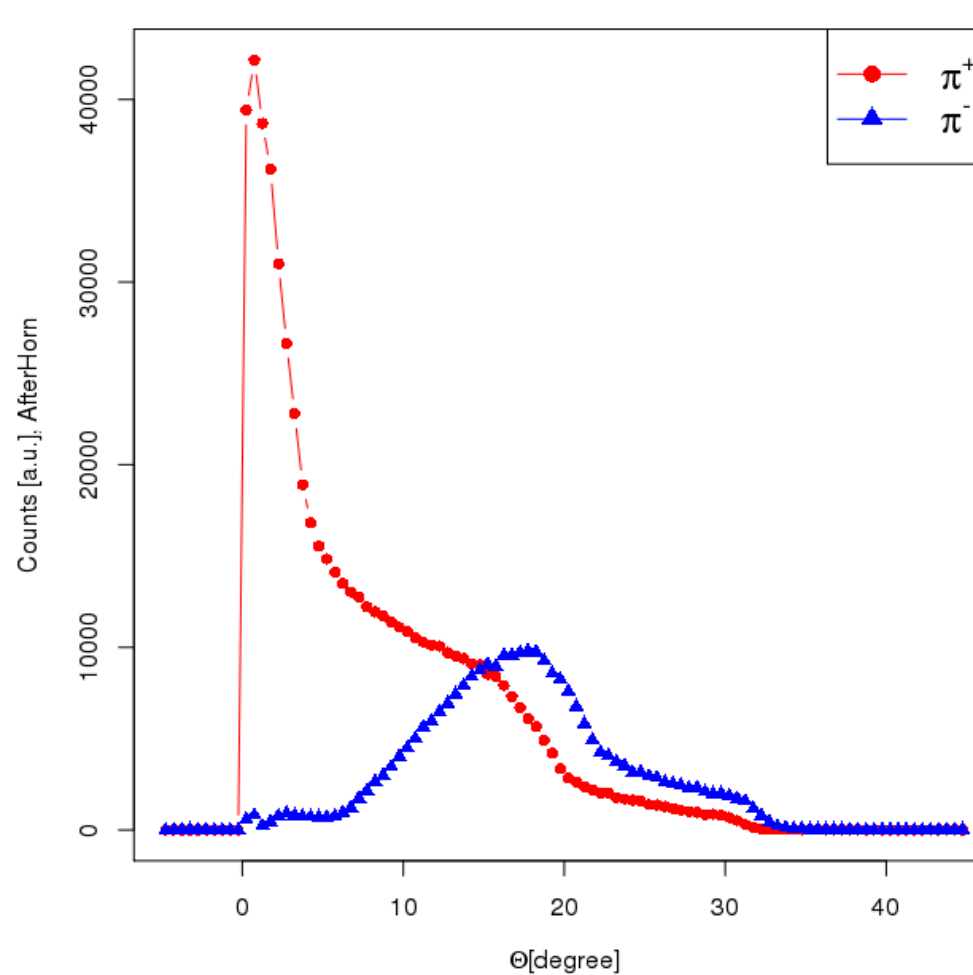
Momentum dependent ratio

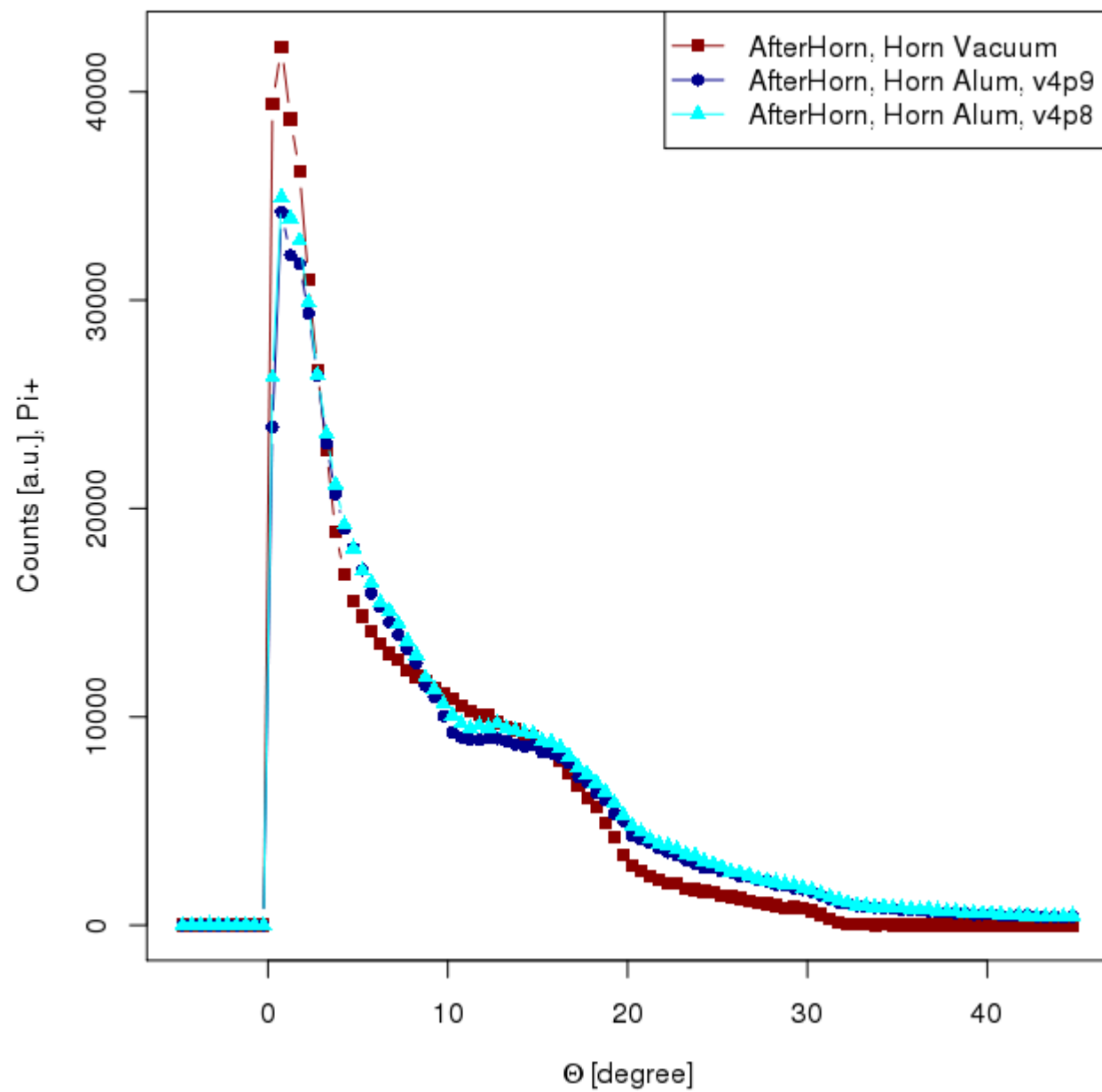Are we focusing the p when the Horn is made of thin air (Vacuum) ?

Angular distributions of pions
Emitted from the primary vertex,
P on Be, MiniBoone/HARP model

(nothing new here.. Just a
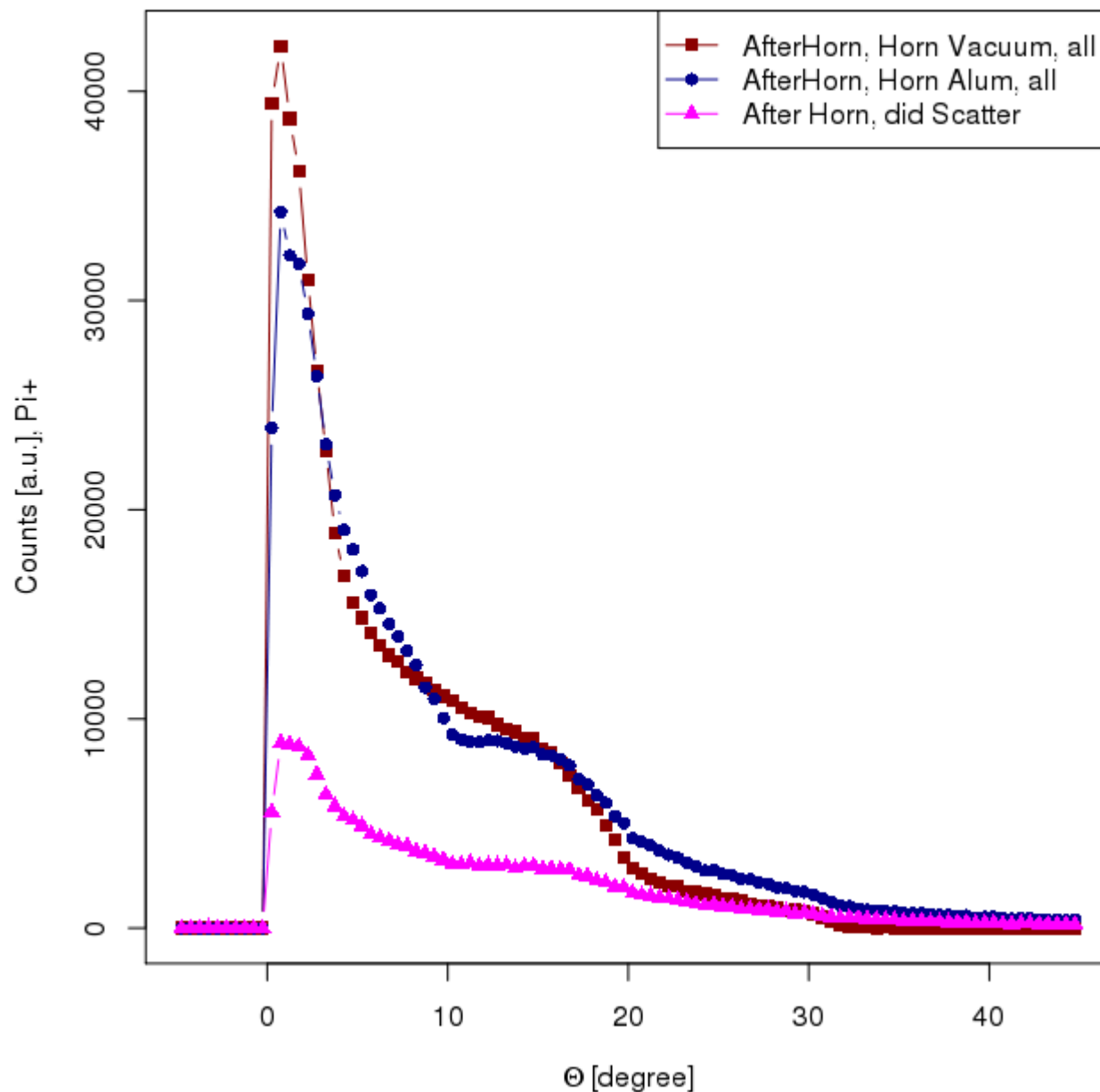Reminder on what the angles are...
..)

Confirming plots.. Checking focusing of pions.

Horn made of Aluminum.
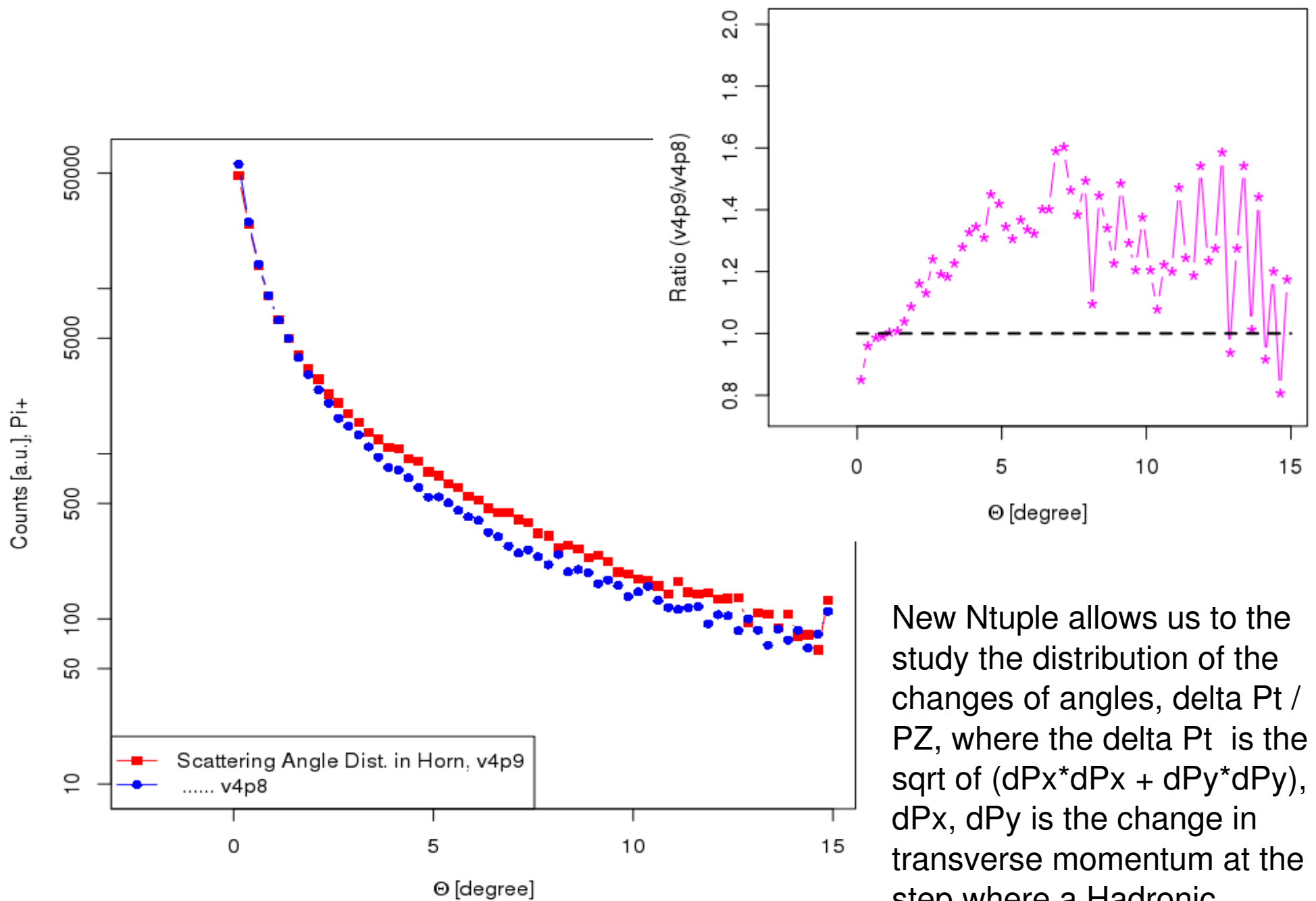
Yes, we are, no problem...

On one frame..

Version 4p9 only

The magenta histogram shows the angle distribution, pion beam axis, for the pions that did scattered in Aluminum.

New Ntuple allows us to the study the distribution of the changes of angles, delta Pt / PZ, where the delta Pt is the sqrt of (dPx*dPx + dPy*dPy), dPx, dPy is the change in transverse momentum at the step where a Hadronic scattering occurred.

The changes of a few mRad don't matter..

Changes of a few degree do …
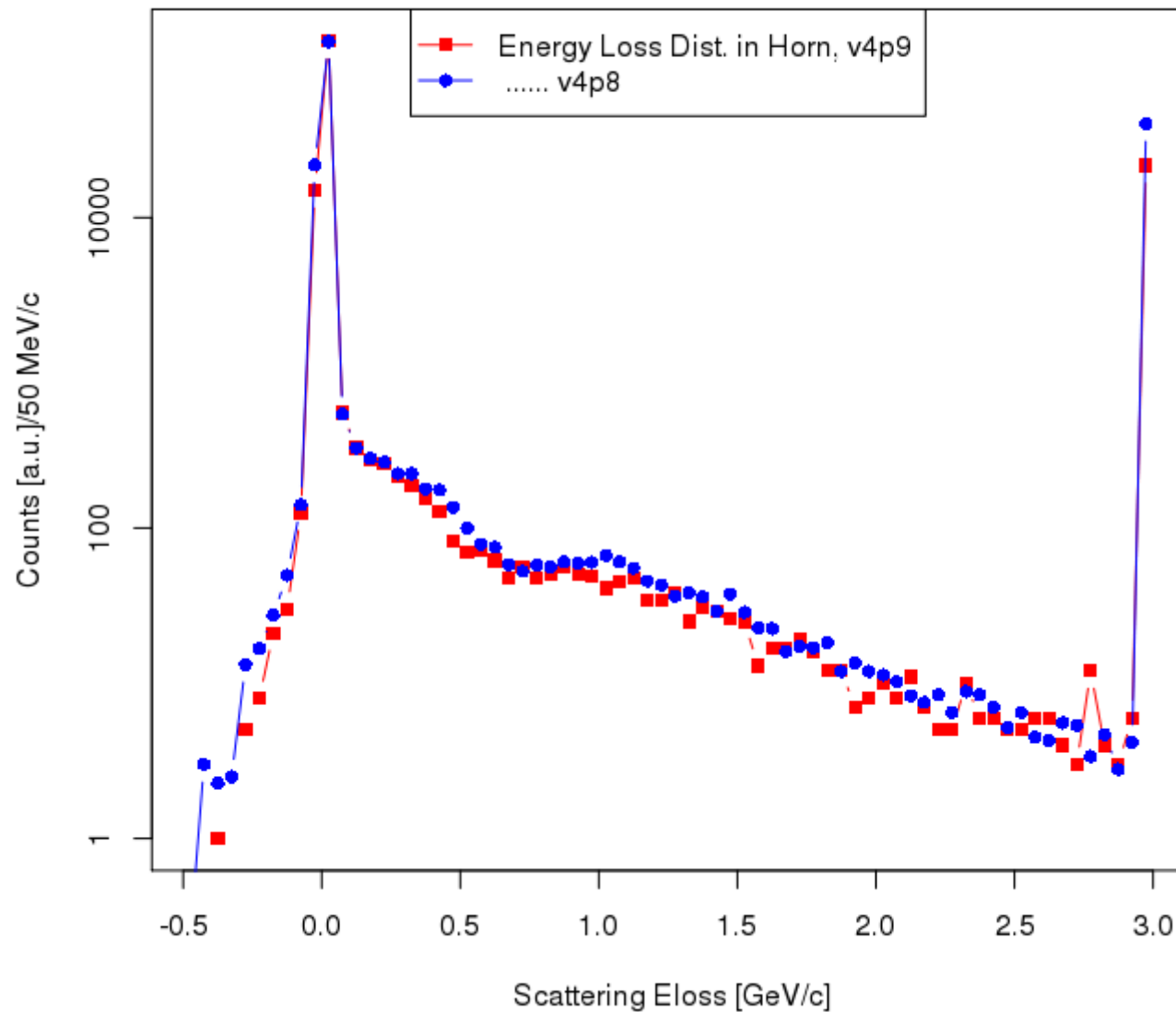
Difference in energy loss distribution between v4p8 and v4p8 are less pronounced..

Exceptt when the Aluminum boosts the pions in the quasi-elastic process...

See negative energy losses)

(Is this physical? Small probabilities, anyways..)

Coming soon: 3 slug comparison of neutrino flux